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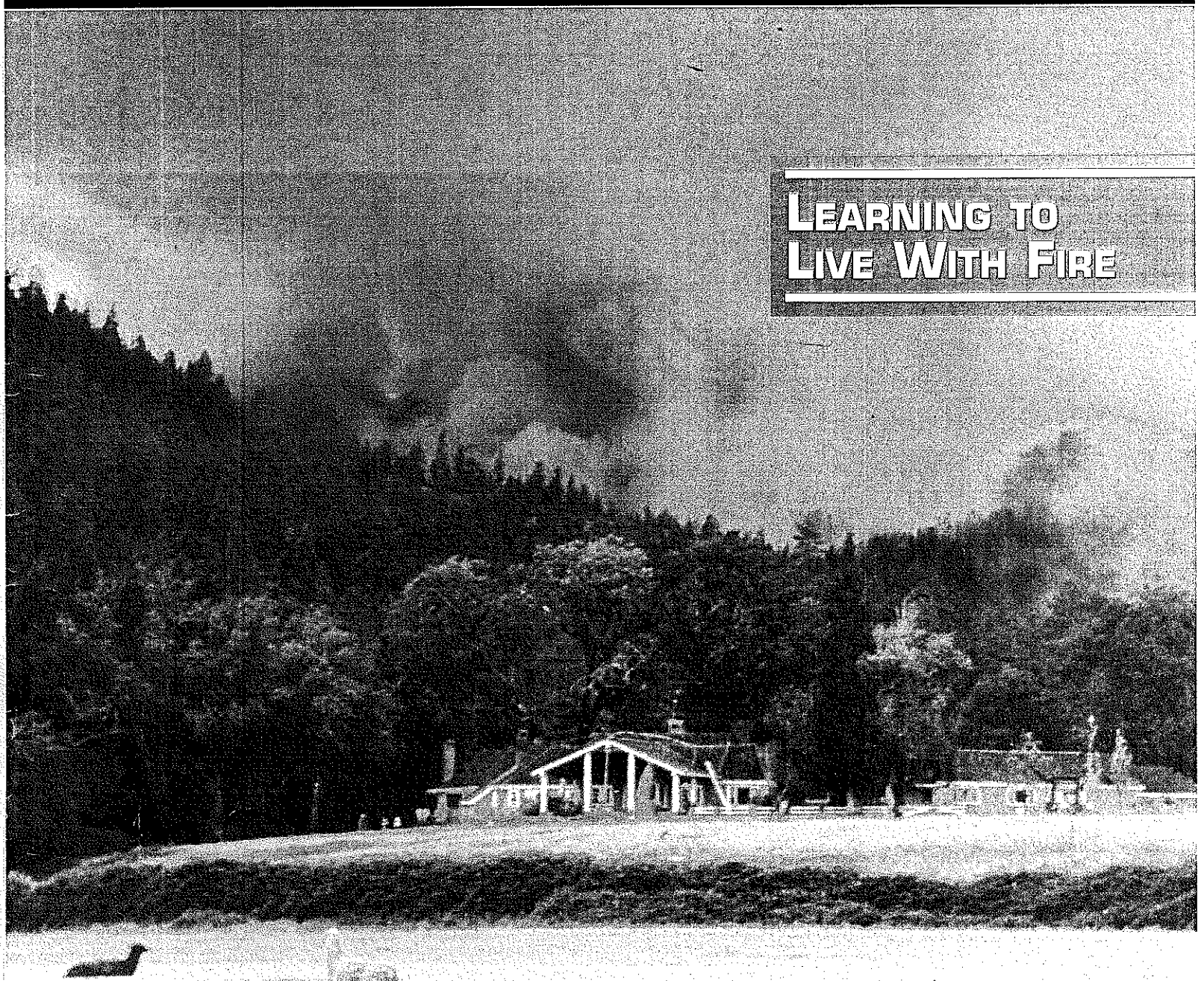
Learning to Live With Fire



United States Department of Agriculture
Forest Service

Testing for Deck Material Flammability

Jim Wheeler

Efforts to reduce fire danger in the wildland/urban interface (WUI) are finally getting the attention they deserve. National and State funding is addressing a century of ecosystem degradation. Local communities are practicing preventive maintenance through fuels reduction and ecosystem stewardship programs. One area, however, is still in need of attention—outdoor deck material.

Why Worry About Decks?

Flagstaff, AZ, is a national leader in firewise construction in the WUI. Subdivision developers must perform forest stewardship (thinning) across the entire site, use class-A roofs, limit combustible exterior siding, and install NFPA 13D sprinkler systems. Such built-in protection systems mitigate the indoor and outdoor fire threat, but they don't address the potential combustibility of deck materials.

Although most deck materials are tested for flame spread rates, the Flagstaff fire authorities couldn't tell from the material safety data sheets whether they are also tested for other effects commonly found in wildland fires, such as ignition potential or energy production. Perhaps manufacturers were not exposing their deck materials to roof tests, such as the burning brand or flying brand tests.

Jim Wheeler is the assistant fire chief and fire marshal with the Flagstaff Fire Department, AZ.

Most deck material is tested for flame spread rates but not necessarily for ignition potential or energy production.

In March 2002, fire marshals from Flagstaff, Prescott, and Payson, AZ, met to discuss the issue of deck flammability. We believed that if decks ignited during a wildland fire, the fire could reach proportions that would break windows and doors, igniting structures with otherwise firewise construction. We decided to conduct an ad hoc test of different deck materials to gain a better understanding of how they perform in a wildfire.

The Decks

Through donations from local lumber and home improvement businesses, we acquired enough material to construct six decks. The deck material included wood products as well as four commonly found types of composite materials. We made one deck from all five test materials combined, one from wood products alone, and four from the composite materials.

The decks were 4 feet (1.2 m) square on 2- by 10-inch (5- × 25-cm) frames. The frames were set on 8- by 8- by 16-inch (20- × 20- × 40-cm) cement blocks stacked 2 feet (0.6 m) high. A fiber-cement siding product was used at the base on two sides to simulate a typical house stemwall (fig. 1). All deck

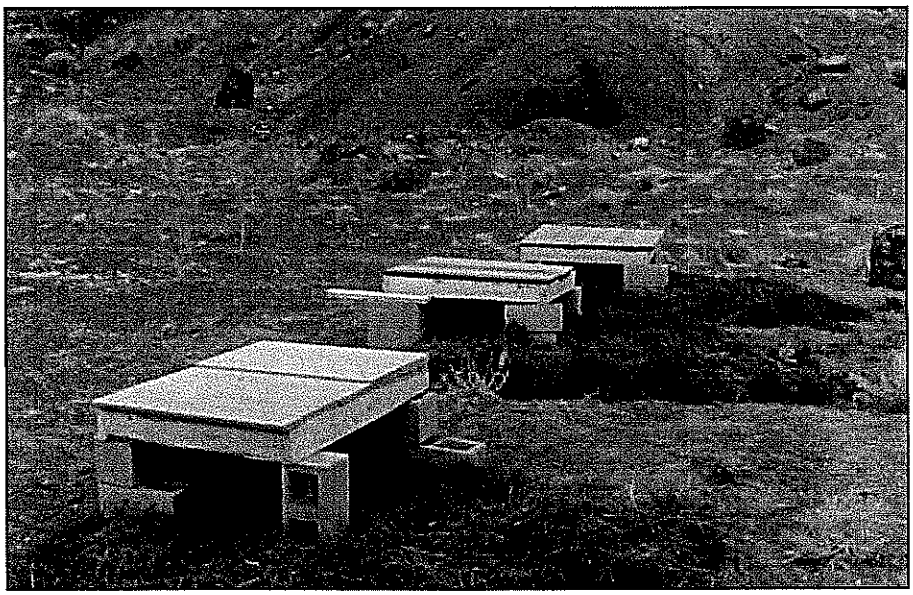


Figure 1—*Typical deck test array. Different products were constructed on wooden frames and placed on cement blocks with a simulated fiber-cement stemwall attached. Photo: Jim Wheeler, Flagstaff Fire Department, Flagstaff, AZ, 2002.*

materials were untreated, and no stain or other flammable liquids were applied.

The Tests

Burning Ember Test. One test involved only the deck made from all five materials combined. We placed hot embers on the deck to simulate ember fallout in advance of a fire front. All of the materials charred slightly. Some quickly self-extinguished, whereas others smoldered for more than 30 minutes without ignition. All embers eventually cooled and self-extinguished (fig. 2).

Surface Fire Test. The other test involved the five decks made from different materials. We placed 2 inches (5 cm) of pine needles under the decks to fuel the kind of running surface fire commonly found in Arizona's WUI. A ventilation fan provided a constant wind of 5 to 8 miles (8–13 km) per hour. We lit the pine needles and waited to see whether the deck material would ignite and how severe the resulting fire would be.

The surface fire ignited all decks tested, but the materials behaved differently after the surface fire exhausted its pine needle fuels and went out. The wood deck was the slowest to ignite, and it self-extinguished relatively quickly (fig. 3). Most of the composite materials ignited easily and resulted in high to extreme fire severity (fig. 4).

But Trex,* a material made from plastic and wood, performed well. Trex was more difficult to ignite

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If decks ignite during a wildland fire, the fire could reach proportions that would break windows and doors, igniting structures with otherwise firewise construction.

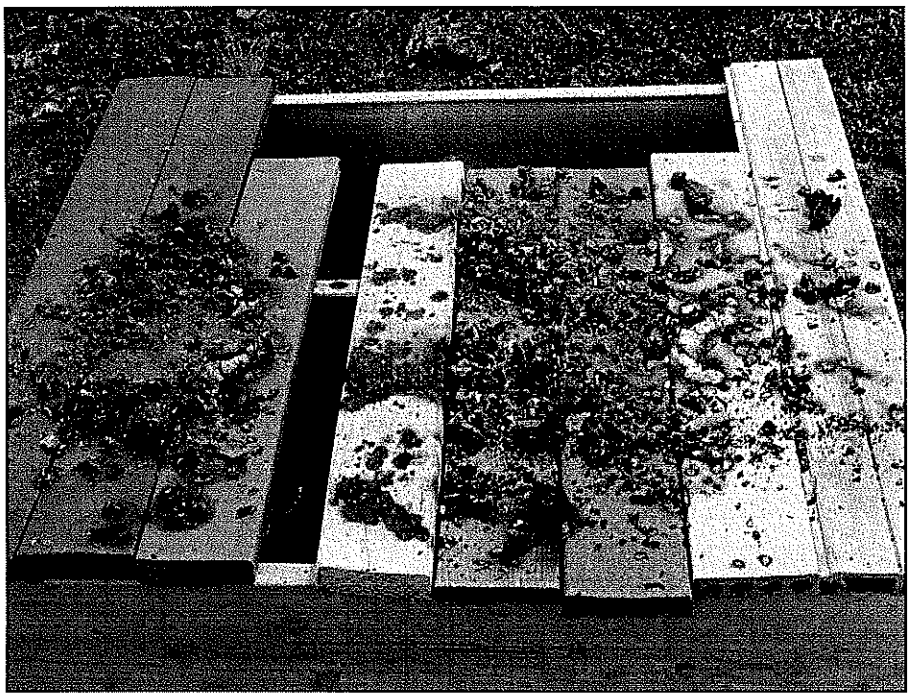

Figure 2—*Burning ember test. Hot embers failed to ignite any of the various materials used to build the deck. Photo: Jim Wheeler, Flagstaff Fire Department, Flagstaff, AZ, 2002.*

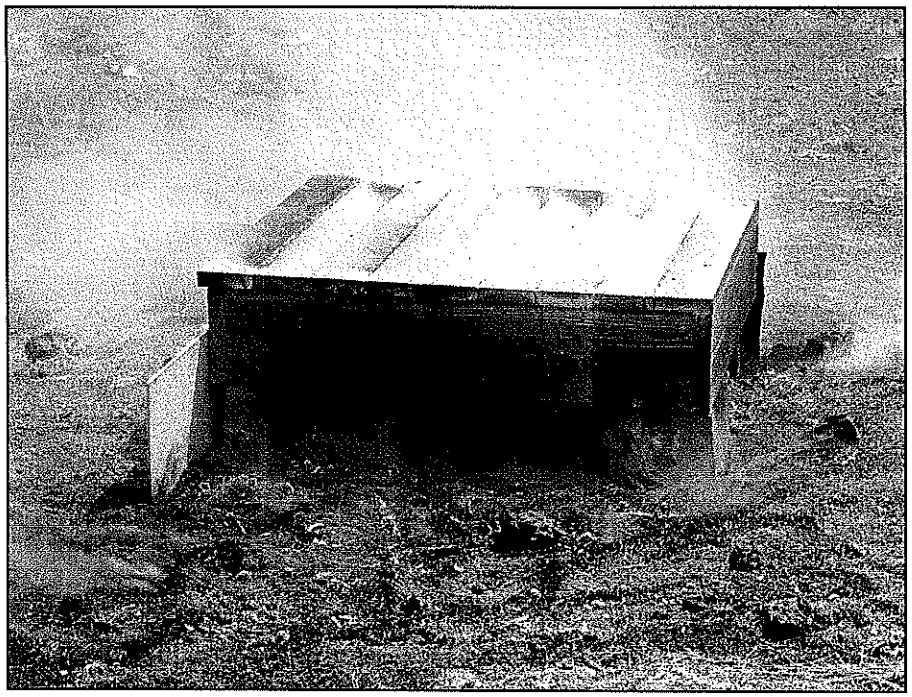

Figure 3—*Wood deck test. The wood deck performed well and resisted ignition from the simulated surface fire. However, no stains or varnishes had been applied to its surface before the test. Photo: Jim Wheeler, Flagstaff Fire Department, Flagstaff, AZ, 2002.*

than the other composites and ultimately self-extinguished (fig. 5). Trex's fire resistance appeared to result from its density. The composites that performed poorly were less dense.

Clear the Decks

We did not test for deck flammability with an accumulation of debris (such as pine needles) on the deck surface. Our burning ember test involved a clear deck surface. Other testing is being done nationally on ember ignition of debris accumulation on decks.

Moreover, our tests weren't strictly scientific. They were designed to demonstrate certain conditions and provide quick results. It is therefore difficult to draw firm conclusions about any of the materials we tested.

However, we did gain enough information to better understand the combustibility of the various deck materials tested, which will help us to institute local policy to better serve the community. Based on the tests, we made three important findings:

- Manufacturers and testing labs should use standard fire tests to determine the specific characteristics of products and materials used in the WUI.
- Although it is impossible to achieve 100-percent certainty when dealing with wildland fire, by reducing fire risks and hazards we can improve the chance of a positive outcome.
- Our surface fire tests resulted in more destructive fires than the burning ember test. If homeowners keep vegetation and debris from accumulating under their decks, they can considerably reduce the risk of surface fire ignition, especially in a wildland area.

The Flagstaff Fire Department has adopted a new fire prevention regulation permitting the use of wood and Trex decks in the WUI. We are also open to testing new and different materials, should someone want to build with a material not analyzed in this test.

For additional information, contact Jim Wheeler or Paul Summerfelt at the Flagstaff Fire Department, 211 W. Aspen Ave., Flagstaff, AZ 86001, 928-779-7688 (tel.). ■

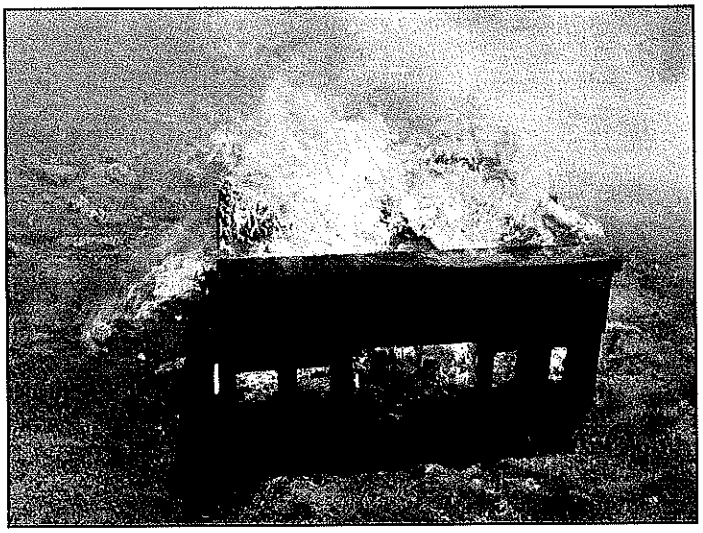

Figure 4—*Composite deck test. The test fire easily ignited the composite materials, which burned with high severity. Photo: Jim Wheeler, Flagstaff Fire Department, Flagstaff, AZ, 2002.*

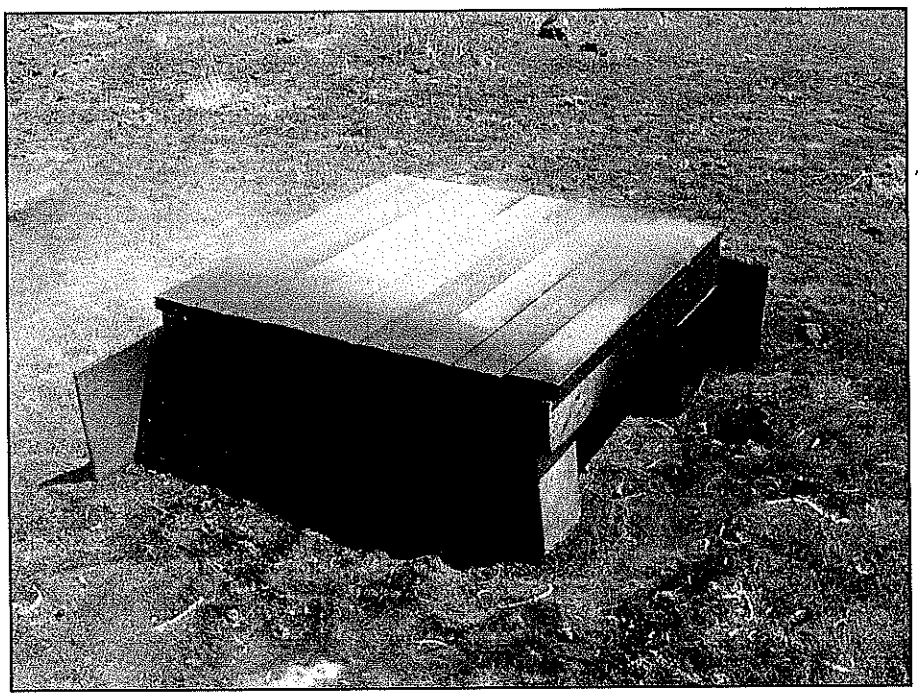

Figure 5—*Trex deck test. Trex was difficult to ignite and self-extinguished when the test fire ran out of pine needle surface fuels. Photo: Jim Wheeler, Flagstaff Fire Department, Flagstaff, AZ, 2002.*